CLAIMS

What is claimed is:

1. A low power voltage-to-current converter for use in a phase lock loop, comprising:

an input stage comprising:

a pair of differential signal input terminals operable to receive differential input signals from a charge pump;

first and second switching transistors each coupled to one of the pair of differential signal input terminals;

first and second complementary transistors coupled to the first and second switching transistor, respectively;

an output stage coupled to the first complementary transistor; and

a non-differential output terminal coupled to the output stage, where the output terminal is operable to transmit an output current signal as a function of the differential input signals.

2. The voltage-to-current converter of claim 1, where the input stage is a rail-to-rail input stage.

3. The voltage-to-current converter of claim 2, where the rail-to-rail input stage is a resistorless input stage.

4. The voltage-to-current converter of claim 1, where the current source comprises a constant current source for the center frequency of the phase lock loop when the difference between the differential input signals is substantially zero.

5. The voltage-to-current converter of claim 1, wherein the output stage comprises a first output stage and a second output stage, the first output stage being coupled to the first complementary transistor and to the non-differential output terminal, the second output stage being coupled to the first output stage.

6. The voltage-to-current converter of claim 5, wherein the second input stage comprises a bandgap reference circuit coupled to a bandgap reference signal and to a supply voltage.

7. The voltage-to-current converter of claim 6, wherein the bandgap reference signal is approximately 1.23 to 1.25 volts.

8. The voltage-to-current converter of claim 1, further comprising a biasing transistor coupled to a bias signal and to a supply voltage, wherein the biasing transistor is configured to generate a bias current for the input stage.

9. The voltage-to-current converter of claim 8, wherein a voltage associated with the biasing signal is approximately half of the supply voltage.

10. The voltage-to-current converter of claim 9, wherein the supply voltage is approximately 1.5 to 5 volts.

11. The voltage-to-current converter of claim 10, wherein the supply voltage is approximately 2.2 volts.

12. The voltage-to-current converter of claim 1, wherein the output stage is operable to provide substantially constant current sources for the center frequency of a phase lock loop resulting in an increase dynamic range of the voltage-to-current converter when the phase lock loop is locked and a voltage difference between the input signals is substantially zero.

13. A phase lock loop circuit comprising a phase and frequency detector coupled with a charge pump, the voltage-to-current converter of claim 1, and a loop filter coupled with the charge pump, the voltage-to-current converter being coupled with a current controlled oscillator that is coupled with the phase and frequency detector.

14. The phase lock loop circuit of claim 13, further comprising a frequency divider coupled between the current controlled oscillator and the phase and frequency detector.

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15. The phase lock loop circuit of claim 13, wherein the phase lock loop including the voltage-to-current converter does not have a dominant pole to degrade the phase lock loop stability.